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TREE COMPONENT INFLUENCES SOIL CARBON STORAGE AND LITTER DECOMPOSITION IN AGROSILVOPASTORAL SYSTEMS

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Integrated farming systems are recognized as agricultural production models that enhance soil carbon storage. This study aimed to evaluate the influence of the tree component on the litter dynamics and soil C and N stocks in an agrosilvopastoral system in the Brazilian Cerrado. We compared nine-years-old agrosilvopastoral system (ASP) with an arrangement of 3x2+14m, with a 24-years-old nominal pasture (NP) and a native vegetation (NV). Five treatments including three sampling points in ASP [between the eucalyptus trees (P1), in the canopy projection area (P2) and in the middle of the alley (P3)], and two areas (PN and VN) were evaluated. Litterfall production from eucalyptus were evaluated in suspended collectors while the decomposition rate was evaluated in litterbags. The assessments were carried out monthly over one year, as well as CO_2 fluxes. Soil samples were taken at six soil layers until 0.5m depth to evaluate bulk density, soil fertility and soil C and N stocks. The litterfall production higher in P1, with decrease during the dry season. P1 and P3 showed higher decomposition rates, with final remaining mass of 28.71 and 32.33%. CO_2 efflux was higher in the rainy season and showed similar pattern between P1 e NV. Regarding the soil fertility, NV showed higher values of macronutrients and base saturation, and these results can be associated to the nutrient exportation and the deficit of fertilization management in ASP and NP. Soil C and N stocks at 0-50 cm depth were higher in NV (115.4 and 11.3 Mg ha^{-1}), followed by NP (92.4 and 8 .8 Mg ha^{-1}) and ASP (89.9 and 9.0 Mg ha^{-1}). In the sampled points within ASP, soil C and N stocks were higher in P1, showing the influence of tree component. Our results showed that the arrangement as well as the management of eucalyptus trees in the integrated farming system influenced the dynamics of litter decomposition and soil C and N storage over time.

Keywords: Eucalyptus, CO2 emissions, Soil fertility, Soil carbon stocks, Integrated farming systems